DDX-60c

60 Channel Digital Demultiplexer

OPERATING MANUAL

JANDS

EMC COMPLIANCE

This product is approved for use in Europe and Australia/New Zealand and conforms to the following standards:

European Norms	Australian / New Zealand Standards
EN 55103-1	AS/NZS 4251.1
EN 55103-2	AS/NZS 4252.1
EN 60335-1	AS/NZS 3350.1

Conformance has been achieved for intended usage in environment E1: Residential.

To ensure continued compliance with EMC Directive 89/336 and the Australian Radiocommunications Act 1992, use only high quality data cables with continuous shield, and connectors with conductive backshells. Examples of such cables are:

DMX: Belden 8102 (100% Aluminium foil screen, 65% Copper braid)

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not properly installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- reorient or relocate the receiving antenna;
- increase the separation between the equipment and receiver;
- connect the equipment into an outlet on a different circuit from that to which the receiver is connected;
- consult the dealer or an experienced radio/television technician for help.

© JANDS ELECTRONICS PTY LTD 1999 All rights reserved

DISCLAIMER

Information contained in this manual is subject to change without notice and does not represent a commitment on the part of the vendor. JANDS ELECTRONICS P/L shall not be liable for any loss or damage whatsoever arising from the use of information or any error contained in this manual.

It is recommended that all service and repairs on this product be carried out by JANDS ELECTRONICS P/L or it's authorised service agents.

JANDS lighting products must only be used for the purpose they were intended by the manufacturer and in conjunction with the user manual.

JANDS ELECTRONICS P/L cannot accept any liability whatsoever for any loss or damage caused by service, maintenance or repair by unauthorised personnel, or by use other than that intended by the manufacturer.

Disconnect mains power when not in use.

Manufactured in Australia by:

JANDS ELECTRONICS PTY LTD ACN 001 187 837
(40 KENT RD)
LOCKED BAG 15
MASCOT NSW 1460
AUSTRALIA

PHONE: +61-2-9582-0909
FAX: +61-2-9582-0999
INTERNET: www.jands.com.au

Table of Contents

Table of Contents 3

1.0 Introduction 5

1.1 Description 5

2.0 Equipment Description 7

2.1 Physical layout 7

3.0 Getting Started 8

3.1 Mains Supply 8
3.2 Connecting power 8
3.3 Connecting DMX-512 input 8
3.4 Connecting DMX-512 outputs 8
3.5 Power-up sequence 8
3.6 Output Voltage Adjustment 9
3.7 Wiring 9
3.8 Rack Mounting 9

4.0 Operating Notes 10

4.1 To Select A Bank 10
4.2 Normal Operation 10
4.3 'Snapshot' Backup Operation 10
4.3.1 Record 11
4.3.2 Replay 11
4.3.3 Clear 11
4.5 Test Modes 11
4.5.1 Test 1 – Channel on 11
4.5.2 Test 2 – Sequential chase 11
4.5.3 Test 3 – Fade channel 11
4.5.4 Test 4 – Channel DMX 12
4.6 Interruptions 12
4.7 Power-up Modes 12

5.0 Fault Finding..... 13

5.1 Fault Finding Table 13

6.0 Installation 14

7.0 Maintenance 14

8.0 Technical Specifications 15

Appendix A Connector Pinouts 16

1.0 Introduction

The JANDS DDX-60 is a professional digital receiver/line-driver designed for use in digital multiplex control systems. Its principle function is to decode 60 channels of DMX-512 serial digital data from a lighting control desk (or similar) into an analog 0 to +10 volts DC for use with older analog input (wire-per channel) dimmers.

The use of digital multiplexing allows up to 512 control channels to be transmitted through a single shielded-pair cable, saving on both cost and weight over a standard analogue system.

1.1 Description

Each DDX-60 decodes signals which conform to USITT DMX-512 specification, and converts them to their analogue equivalent. This specification allows for up to 512 control channels to be sent via a balanced digital line. Each DDX-60 decodes a bank of 60 channels as selected by the switches on the front panel. Where more than one DDX-60 is used in a system, the digital line is 'daisy-chained' using the "DMX OUT" connector on the front panel. Each DDX-60 on this line will terminate the line and re-transmit the control information automatically, resulting in optimum signal transmission in bad conditions.

The 60 analogue outputs are directly compatible with most existing wire-per-channel receivers, such as dimmers and colour scrollers, being 0 to +10 Volts DC. The outputs are terminated on five 15 pin 'D' connectors on the front, suiting both temporary and permanent applications.

The DDX60 is designed to run from most mains power systems. It will accept an input voltage from 100 to 240V AC 50/60Hz.

Each unit comes ready to mount in a standard 19" rack and occupies one rack space ($1^{3}/_{4}$ inches).

FEATURES

- Advanced software features make the DDX-60 operator-friendly:
  - In-built Test software aids system testing and lamp focusing.
  - Output Hold facility retains the output levels present immediately prior to disconnection of the digital data cable.
  - Internal memory stores bank setting and backup Snapshot facilities.
  - Low-battery display notifies operator when internal battery needs replacing.
- Accepts DMX-512 protocol:
  - This is the digital multiplex system specified by the USITT. Using this protocol allows the DDX-60 to be used with a variety of existing and future equipment without the need for costly interfaces and converters.
  - Allows existing analogue systems to be upgraded to digital control simply and effectively without having to invest in a complete digital system.
- Control Line Output Drive:
  - To optimise the data transmission, each DDX-60 operates as a repeater for the DMX-512 control line, retransmitting the data instead of simply receiving only. In the event of a power failure, the control line is automatically switched through, maintaining signal to other receiving units.
- Full 8 bit conversion giving smooth unstepped response.
- 60 output channels for direct connection to analogue dimmer control inputs.
- All analogue outputs are short circuit protected.
- Outputs on 15-pin ‘D’ connectors suitable for temporary or permanent installations.
- Industry standard input/link connector (5-pin AXR).
- Reduced cable costs, size and weight.
- 100 - 265 Volt AC universal mains operation.
- Two year warranty (Australia only).
- Steel 19" single rack-unit chassis.

2.0 Equipment Description

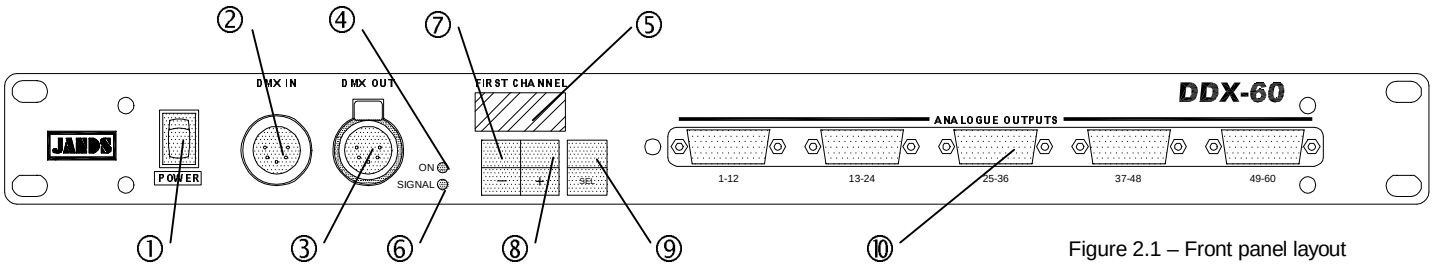


Figure 2.1 – Front panel layout

2.1 Physical layout

Figure 2.1 (above) shows the layout of the front panel. The following is a short description of the labelled items.

1 POWER SWITCH

Turns mains supply on and off.

2 DMX IN CONNECTOR

DMX signal input from control desk.

3 DMX OUT CONNECTOR

DMX 'through' signal for 'daisy-chain' distribution to other DMX devices.

4 ON LED

Low voltage supply OK and software initialisations completed.

5 3-DIGIT LED DISPLAY

Displays channel start and test information.

6 SIGNAL LED

Indicates when the unit is receiving DMX signal.

7 "-" SWITCH

Used for changing the start channel and test functions.

8 "+" SWITCH

Used for changing the start channel and test functions.

9 "SEL" SWITCH

Must be pressed with the "+" or "-" switch to change banks.
Functions as an "Escape" switch when DDX-60 is in Test mode.

10 DB15 OUTPUT CONNECTORS

Twelve sequential 0 to +10 volt DC analog outputs appear on each of these five connectors.

3.0 Getting Started

3.1 Mains Supply

The power supply in the DDX-60 is a universal switching type, and will run reliably from mains voltages of 100 to 240 volts AC 50/60 Hz. There is no need for the user to make any adjustments to the power supply or the wiring.

3.2 Connecting power

Connect a standard IEC plug and cable to the DDX-60 inlet socket. Switch the front panel "POWER" switch on. The red "POWER" LED will light if the DDX-60 is operating.

NOTE

The DDX-60 must be connected to a 3 pin earthed power source. Use of 2 pin (non-earthed) power sources will reduce the ability of the DDX-60 to protect against high voltage shield faults.

3.3 Connecting DMX-512 input

The DDX-60 input signal should conform to the USITT DMX-512 (1990) specification. The DMX-512 input connects to the DMX IN socket on the front panel. Turn off, connect a digital control source, and turn on again. The green "SIGNAL" LED will light if the digital control data is of the correct protocol and data rate. See Appendix A for connector wiring details.

3.4 Connecting DMX-512 outputs

The DDX-60 output signals are an amplified copy of the input signal. Connect the DMX OUT to the next unit's DMX IN if multiple receivers are being used. See Appendix A for connector wiring details.

3.5 Power-up sequence

When powering up, a system should be powered up in the order it appears in the DMX-512 system, starting from the console and proceeding to any splitters or softpatches, and finally to the dimmers or fixtures. The DDX-60 should be powered up in its appropriate position in the system.

This procedure minimises the risk of producing the lighting equivalent of an audio "thump" and prevents damage to lamps, dimmers, and other controlled devices.

Use the reverse procedure when powering down.

3.6 Output Voltage Adjustment

As supplied, a DDX-60 will output +10 Volts DC at full. This may be adjusted over the range +9V to +11V if required to interface to non-standard equipment or to compensate for cable voltage drops.

If so, unplug the power lead and remove the lid (6 screws) to gain access to the Output Trim adjustment (VR1) located at the upper right of the PCB.

Apply power, and run Test 1 (see section 4.5.1). Referring to Figure 3.6, adjust the Output Trim level to give the required output voltage (preferably measured with a digital voltmeter) between pins 1 and 15 of the first 'D' connector. All channels will now output to the new level.

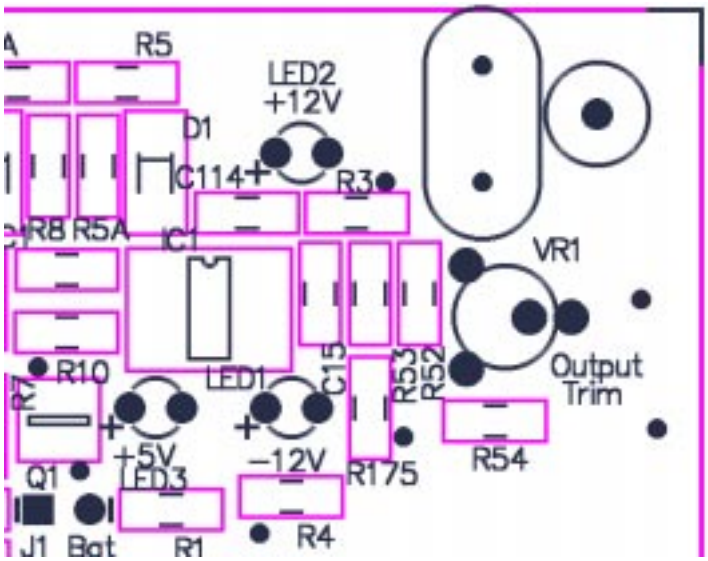


Figure 3.6 Output Trim adjustment

3.7 Wiring

The analogue outputs are arranged in five groups of twelve channels, to simplify the interface between the DDX-60 and 12 channel dimmers. Plug in the appropriate leads, and screw the retaining screws home. Again, the leads should be wired as in Appendix A. If more than one DDX-60 is to be driven from the one control desk, plug a daisy-chain lead from the first DDX-60 "DMX OUT" socket to the next unit's "DMX IN" socket.

3.8 Rack Mounting

The DDX-60 has been designed to be installed in a standard 19" rack, and occupies one rack space. When mounted with dimmers, it should be placed beneath the dimmers to minimise heat build-up. Slide the unit into its position in the rack, and secure using four rack screws.

When mounted in a rack, ensure adequate access to the mains input socket at the rear left of the unit (when viewed from the front) for replacement of the mains fuse.

4.0 Operating Notes

4.1 To Select A Bank

The DDX-60 selects a bank of 60 sequential channels from the possible 512 available on the DMX-512 line and shows the number of the first decoded channel on the 3-digit LED display.

The '+' and '-' switches on the front panel are used to select the start channel of the bank of 60 to be decoded. To prevent accidental changing of these switches once set, the 'SELect' switch must be pressed with the '+' or '-' to actually change the start channel. Pressing 'SEL' and '+' will increment the start channel, whilst 'SEL' and '-' will decrement it. Holding down both switches will fast increment or fast decrement the Display. Pressing all three switches together will select channel 1.

> eg. If the display shows '13', then the DDX-60 channel 1 output will be channel 13 of the received DMX signal. Channel 60 will therefore be channel 72 of the DMX signal. If the '-' and 'SEL' switches are now pressed, the display will then show '12' as the first channel to be decoded, so DDX-60 channel 1 output corresponds to channel 12 of the DMX, and DDX-60 channel 60 output will be channel 71 of the DMX.

Note: If desired, more than one DDX-60 can be set to the same or overlapping banks, resulting in parallel outputs.

4.2 Normal Operation

The green "SIGNAL" LED lights when the data is updated. If the LED flashes or does not light, refer to the FAULT FINDING TABLE in Section 5.1.

If the control console stops transmitting or the control line is severed, the DDX-60 holds the levels present immediately prior to the data loss.

When the memory backup battery is getting towards the end of its life, the DDX-60 will alert the user by displaying 'bAt' on the LED display immediately after being turned on. This display will remain on until the 'SEL' switch is pressed, after which the DDX-60 will resume normal operation. If the 'bAt' indicator is displayed, the internal battery should be replaced to prevent the DDX-60 forgetting its settings when turned off.

CAUTION

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

4.3 'Snapshot' Backup Operation

The DDX-60 provides an emergency backup mode for the situation where the control desk 'crashes' or the DMX signal is interrupted for some time. The DDX-60 will hold the last received transmission in memory, but if this is not suitable for the activity on stage, the DDX-60 can recall a pre-recorded 'Snapshot' of up to 512 channels.

4.3.1 Record

To record a Snapshot, the DDX-60 must be receiving DMX. The illuminated green 'Signal' LED will confirm this. Turn off the Power switch and turn on again with the '-' and 'SEL' switches pressed. The display should now show '???'. Pressing the '+' switch will record the DMX information into the Snapshot memory and the display will show 'SnP' for 1 second as verification, before reverting to the normal display.

4.3.2 Replay

Turn on the DDX-60 with all three switches pressed. The display will be as per normal, except the signal LED will be off. The bank may be changed as per normal operation. To revert to normal operation, reset the DDX-60 by turning the Power switch off and then back on. The 'Signal' LED should come on to indicate receiving of DMX once more.

4.3.3 Clear

To clear a Snapshot, turn off the Power switch and turn on again with the '-' and 'SEL' switches pressed. The display should now show '???'. Pressing the '-' switch will clear the DMX information stored in the Snapshot memory to all zeroes and the display will show 'CLr' for 2 seconds as verification, before reverting to the normal display.

4.5 Test Modes

There are several Test modes on the DDX-60 to assist with lamp patching and focusing, and also troubleshooting. When in these Test modes the Display will show a 't' in the left digit.

4.5.1 Test 1 – Channel on

Test 1 is accessed by turning on the DDX-60 with the 'SEL' switch pressed. The display will show 't 1', and channel 1 output will be turned on at full. Pressing the '+' switch will turn on channel 2 output and turn off channel 1. Pressing '+' again will turn on channel 3 output, etc. Pressing the '-' switch decrements the channel output. Decrementing channel 1 will wrap around to channel 60.

This mode enables the lamps to be tested or focused without the need for a lighting console to be connected.

4.5.2 Test 2 – Sequential chase

Test 2 is accessed by turning on the DDX-60 with the '+' switch pressed, or by pressing 'SEL' when in Test 1. This test automatically turns on and off each channel in sequence. The rate can be changed with the '+' and '-' switches, with four rates available from slow to fast.

4.5.3 Test 3 – Fade channel

Test 3 is accessed by turning on the DDX-60 with the '+' and 'SEL' switches pressed, or by pressing 'SEL' when in Test 2. This test continuously fades up and down the selected channel from off to full to off to full etc. Pressing the '+' and '-' switches changes the selected channel.

4.5.4 Test 4 – Channel DMX

Test 4 is accessed by turning on the DDX-60 with the '-' switch pressed, or by pressing 'SEL' when in Test 3. This test displays, in Hexadecimal (00 to FF), the current DMX level information for a selected channel of the first 60 DMX channels. Pressing '+' or '-' changes the selected channel. The selected channel number is displayed whilst the switch is held down, and the channel level is displayed on releasing the switch. Pressing 'SEL' exits to Snapshot. If Snapshot is not required, press 'SEL' once more to exit Test mode.

4.6 Interruptions

Should the DMX cable become disconnected or the control console stop transmitting, the DDX-60 will continue to output the last received information until switched off. When reconnected to a working DMX source, the outputs will be updated.

If the mains power to the DDX-60 is interrupted, the unit will retain the same bank settings and Snapshot when turned on again (provided the internal battery is not flat).

4.7 Power-up Modes

'-'	'+'	'SEL'	FUNCTION
0	0	0	Normal
0	0	1	Test 1
0	1	0	Test 2
0	1	1	Test 3
1	0	0	Test 4
1	0	1	Snapshot Record/Clear
1	1	1	Snapshot Replay

0 = switch off, 1 = switch on

5.0 Fault Finding

5.1 Fault Finding Table

Fault Symptom	Possible Cause	Remedy
No power indication	Blown fuse. Mains disconnected. Front panel switch not on. Power supply fault.	Replace fuse. Reconnect mains cable. Turn on power switch. Replace power supply
No DMX signal indication	Input cable fault. DMX source not transmitting.	Replace / reconnect cable Replace source.
Display shows ‘bAt’ on power up	Low battery	Replace internal backup battery
Erratic or no analog output	Faulty DMX cable. Faulty analog cable. Bank selected not valid. DMX protocol incorrect.	Replace cable. Replace cable. Check what channels are being sent by the control desk. Check / replace DMX source

6.0 Installation

The DDX-60 is designed for mounting in standard 19 inch equipment racks. Adequate ventilation should be provided around the top of the chassis, however no blank spaces are required above or below the DDX-60 specifically for ventilation of this device. Note that such spaces may be necessary to prevent the ambient temperature from rising above the maximum if other heat producing devices are mounted in the same rack.

No rear mounting is necessary due to the low weight of the unit.

Ensure adequate power cable and fuse replacement access when rack mounting. The power entry is located at the rear left when viewed from the front.

7.0 Maintenance

WARNING

DO NOT ALLOW THE ENTRY OF LIQUIDS OF ANY SORT INTO THE DDX-60

With care, the DDX-60 will require little or no maintenance. If a fault develops refer to the FAULT FINDING TABLE in Section 5.1. If the unit will still not perform as described, the DDX-60 should be taken to an authorised JANDS distributor for professional service.

Use a mild detergent and water with a soft cloth or paper towel to clean external surfaces, taking care to prevent water entering the chassis.

DO NOT spray liquids onto the panels.

DO NOT use solvents for cleaning the panels.

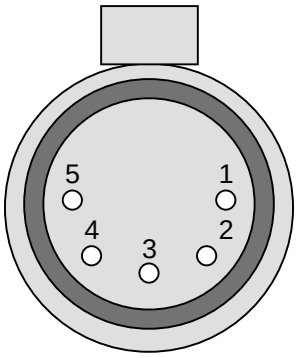
8.0 Technical Specifications

JANDS DDX-60 DIGITAL DEMULTIPLEXER *SPECIFICATIONS*	
Mains Supply:	100-240V AC, 50-60Hz, fully earthed
Fuse:	2A, M205 delay type
Switch-on surge:	8A maximum for one mains half cycle (10 msec)
Power consumption:	25VA maximum
Operating Temperature:	45°C maximum ambient
DMX Connections:	DMX In, DMX Out
DMX Connectors:	5-pin AXR
Input Signal:	Electrically must conform to RS485A
Data Protocol:	Must conform to full speed USITT DMX-512 1990 specification. 250K baud, 1 start bit, 8 data bits, 2 stop bits, no parity.
Output Impedance:	100 ohms
Analog Outputs:	Sixty (60), 0 to +10 volts DC
Output connectors:	15-pin D-connector
Output Protection:	100 Ohm series per channel
Construction:	Zinc plated all-steel chassis
Dimensions:	D: 120mm W: 483mm H: 44mm
Weight:	2.1 kg
Ingress protection rating:	IP20
Rack mounting requirements:	1 x 19” rack space / standard spacing for mounting holes. No extra ventilation requirements. No blank spaces required between units. Power inlet at rear left (looking from front of unit). Power access required for mains fuse replacement.

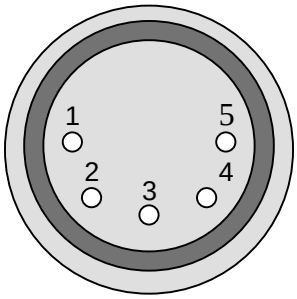
Appendix A Connector Pinouts

DMX connector pin-outs

PIN No	CONNECTION (DMX IN)	CONNECTION (DMX OUTPUT)
1	RC NETWORK TO CHASSIS	CHASSIS
2	IN-	OUT-
3	IN+	OUT+
4	NC	NC
5	NC	NC



DMX OUT CONNECTOR



DMX IN CONNECTOR

Suitable cable types:	Hartland HC2522	1 pair, shielded
	Belden 8101	1 pair, shielded
	Belden 8102	2 pairs, shielded.

It is recommended that the specified cable type be used in all conditions. However, for short runs other cable types will operate successfully. Experimentation is the best method for determining the suitability of a cable. Note that the cable must have two cores within the shield. Note also that digital control cables should NEVER be 'Y'-split to obtain two outputs. If more than one output is required, an active splitter-box should be used.

D-Connector Pin Terminations

D-CONNECTOR PIN	CHANNEL OUTPUT				
	CONN1	**CONN2**	**CONN3**	**CONN4**	**CONN5**
1	1	13	25	37	49
2	2	14	26	38	50
3	3	15	27	39	51
4	4	16	28	40	52
5	5	17	29	41	53
6	6	18	30	42	54
7	7	19	31	43	55
8	8	20	32	44	56
9	9	21	33	45	57
10	10	22	34	46	58
11	11	23	35	47	59
12	12	24	36	48	60
13	GND	GND	GND	GND	GND
14	GND	GND	GND	GND	GND
15	GND	GND	GND	GND	GND

MANUAL ENDS